

K-6

Primary Science and Technology

# Weather



Teachers' Guide

# Weather

MODULE 1: K – 2

MODULE 2: 3– 4

MODULE 3: 5– 6

## Preface

The development of learning outcomes for the core curriculum in OECS primary and lower secondary schools is an essential part of the harmonization of OECS educational systems. The curriculum harmonization process commenced seven years ago with discussions between the OECS Education Reform Unit (OERU) and educational personnel in all member countries (See *Eastern Caribbean Education Reform Project: Initiative on curriculum and remediation – Design Mission report, February 1998*).

The initiative in Primary Secondary Science and Technology commenced in 2001, with a meeting of science and technology educators in St. Vincent and the Grenadines. Time was spent initially on defining science and technology, mainly because the primary curriculum concentrated on science only. A working definition has been developed and has been used consistently throughout the development of the programme.

Draft learning outcomes were developed and circulated for comments throughout the curriculum units in the OECS. Subsequent meetings of the working group were held in St. Kitts and Nevis, St. Lucia and Antigua and Barbuda. At each of these meetings teacher educators, teachers and principals formed part of the discussion groups. After the learning outcomes were adopted by the curriculum officers, instructional modules to serve as teachers' guides were planned and developed by members of the working groups. The learning outcomes and modules were all reviewed and edited by the two consultants who worked through all phases of the project.

Time did not permit a formal piloting of the learning outcomes and modules. Since in most cases the same curriculum officer worked on the lower secondary curriculum also, there is the possibility of the primary curriculum benefiting from the experience gained in the piloting of the lower secondary programme.

The purpose of developing the learning outcomes and instructional modules is to ensure that all children in OECS primary schools attain an acceptable level of knowledge, skills and attitudes associated with science and technology. Each member country retains the right and responsibility for integrating these outcomes into the national primary science and technology curriculum. As usual, teachers will continue to use their initiative and resourcefulness in the implementation of the programme through the use of indigenous resources creating relevance.

The OERU is extremely grateful for the contribution made by all persons and institutions that have been involved in this developmental exercise. First, OERU expresses thanks to the Canadian International Development Agency (CIDA) for the high level of interest shown and the funding provided for the Eastern Caribbean Education Reform Project (ECERP). The Ministries and Departments of Education have contributed resource personnel, accommodation, refreshment, ground transportation, and some materials for workshops. Most important, however, have been the high level of cooperation and commitment to the reform effort displayed by both the administrative and professional sections of Ministries of Education.

The following science education professionals have made significant contribution over the four-year period.

<b>Country</b>	<b>Participant</b>	<b>Designation</b>
<b>Anguilla</b>	Mr. Worrell Brooks	Education Officer, Science
	Mrs. Maria Webster	Secondary School Teacher
<b>Antigua and Barbuda</b>	Mr. Earl Skerritt	Science Coordinator
	Ms. Kendra Thomas	Primary School Teacher
	Ms. Celia Frederick	Secondary School Teacher
	Ms. Gracelyn Ireland	Primary School Teacher
<b>British Virgin Islands</b>	Ms. Beverlie Brathwaite	Education Officer, Science
<b>Dominica</b>	M. Frank Newton	Education Officer Science
	Mr. Gerald Corbette	Lecturer, Dominica State College
<b>Grenada</b>	Mr. Jervis Viechweg	Curriculum Officer, Science
	Ms. Janis Henry	Lecturer, T. A. Marryshow Com. College
<b>Montserrat</b>	Mr. Gregory Julius	Primary school Principal
<b>St. Kitts</b>	Mr. Hilton Clarke	Curriculum

<b>And Nevis</b>		Officer, Science
	Dr. Lincoln Carty	Former Curriculum Officer, Science
<b>St. Lucia</b>	Mr. Winston Blanchard	Curriculum Officer, Science
	Ms. Imelda Polius	Former Primary School Teacher
<b>St. Vincent</b>	Mrs. Arlette Keane-Browne	Former Curriculum Officer, Science
<b>and the Grenadines</b>	Mrs. Amaala Muhammad	Curriculum Officer, Science
	Mr. Kenroy Johnson	Principal, Secondary School

The OERU also expresses gratitude to the dozens of teachers, principals and students who have participated in discussions and consultations.

The actual planning and subsequent developmental process for the learning outcomes and Teachers' Guide became the responsibility of Dr. Cheryl Remy, former Senior Lecturer at Sir Arthur Lewis Community College, St. Lucia and Professor Winston King, Senior Lecturer, School of Education, UWI, to whom the OERU is very grateful. As a team, Dr. Remy and Professor King have encouraged workshop participants and module writers to think and to create ideas as the work progressed.

The staff at OERU together contributed in no small measure to these modules. Ms. Deborah Alphonse, Accounts/Administrative Assistant, Ms. Natasha Deterville, now Secretary to the Director of Economic Affairs in the OECS, and Ms. Cleotha Randolph, Documentation Officer, worked tirelessly arranging workshops and reproducing materials. Ms. Natalie Compton of Nagio Creations competently designed the layout of the modules and learning outcomes for printing and electronic reproduction.

Dr. Henry Hinds, formerly Curriculum Specialist at OERU, was responsible for the curriculum project. Mrs. Lorna Callender and Ms. Candia Alleyne, both former Heads of OERU, have supported the project organizationally and morally. Mr. Johnson Cenac, ECERP Officer, made significant contributions in various ways and at various times throughout the development of this work.

The Primary Science and Technology modules provide an excellent example of the fusion of talent, creativity, rigorous science and technology and cooperation to develop a valuable resource for teachers.

The OERU hopes that principals and teachers will continue to play their roles in making the outcomes and modules come to life in classrooms throughout the OECS. The commitment and effort surely will contribute to the enhancement of knowledge, and skills and the development of positive attitude towards science and technology.

Henry Hinds, Head, OERU

August, 2006

## Weather

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## **RATIONALE**

Earth has been the home of people for centuries and will be for a long time to come. Therefore we must learn as much as we can about Earth, its resources, its weather and its place in the solar system.

As we live on Earth we need to develop ways by which we can live harmoniously with nature. The forces of nature can affect us tremendously, while our way of life can have adverse effects on our environment. In our Caribbean region we are continually exposed to the ravages of strong winds, floods, landslides and other factors caused by weather patterns. Students need to learn about our weather, its effects on our lives and the technological measures which are taken to help us deal with different types of weather.

## **INTRODUCTION**

The modules are so structured as to enable teachers to enhance the learning process in the classroom. They provide students with the opportunity to engage in hands-on activities involving the use of scientific process skills and attitudes students will develop inquiry and problem-solving techniques. As the engage in learning activities, students will be made aware of the role of technology in our world and its effect on our lives. The modules provide students with opportunities to develop their inventiveness and creativity through a number of well-structured activities.

It is hoped that the modules, will enable the goals and objectives to be attained by the teachers and students in schools in the O.E.C.S. schools.

**THE EXPERIENCES IN THESE MODULES WILL HELP THE STUDENTS TO DEVELOP THE FOLLOWING MAJOR IDEAS**

**EARTH'S WEATHER**

- *The weather is the state of the atmosphere at any given point in time.*
- *There are elements that make up the weather, such as clouds, water vapour and precipitation.*
- *The weather changes from time to time.*
- *Weather affects the activities of humans and other living organisms.*

**TECHNOLOGY**

- Technological methods involve the use of problem solving, technological processes and resources to find solutions to people's wants and needs.
- Technology is a human activity.
- Individuals can take part in Technological activity.
- Technology involves the uses of materials, energy, tools/machines and information.
- Technological activities include Biotechnology, Production Technology and Transportation.
- Technology changes over time.
- Technology is neither good nor bad, but the way we use it can have positive or negative effects on our lives.
- The use of technology has side effects.

**SCIENCE TECHNOLOGY, SOCIETY AND THE ENVIRONMENT**

- Science and Technology affect human life, the society and the environment.
- The impact of Science and Technology can be positive or negative, unplanned or planned, immediate or delayed.
- There should be sustainable use of resources and efforts should be made to minimize ecological disturbances.
- People's values, beliefs and attitudes influence Scientific and Technological activity and use.

**MODULE 1**  
**EARTH'S WEATHER**  
**GRADES K - 2**

## **GENERAL OBJECTIVES**

Students should be able to:

1. Become aware that the weather changes and that these changes affect people's activities.
2. Realize that humans can make and use tools/instruments to measure the components of the weather.
3. Realize that humans can make things and structures to solve problems related to the weather (e.g. umbrellas, shutters, sunglasses, different types of clothing, etc.).
4. Construct instruments to observe and record the conditions of the weather.
5. Construct a device to deal with weather conditions.

## **SPECIFIC OBJECTIVES**

The students should be able to:

1. Observe different types of weather – rainy, sunny, cloudy and windy.
2. Observe changes in weather patterns over a specified period.
3. Make weather charts, using pictures, to illustrate daily weather changes.
4. Construct graphs (pictographs and/or bar graphs) to illustrate weather patterns over a specified period.
5. Interpret data presented from objectives 3 & 4.
6. Predict weather patterns.
7. Discuss how the different types of weather affect one's activities.
8. Identify articles of clothing, structures and devices that humans make to deal with different weather conditions.
9. Draw a simple diagram to represent the water cycle.
10. Identify and record the direction from which the wind is blowing at different periods.

11. Differentiate between hot and cold without using a thermometer.
12. Discuss what a thermometer is and what it is used for.
13. Design and construct a simple wind vane (with the four basic cardinal points) to detect wind direction.
14. Design and construct a simple rain gauge to measure rainfall.
15. Design and construct a simple anemometer to measure wind speed.
16. Take and compare measurements of rainfall, temperature, wind direction and wind speed on different days.
18. Design and make models of things used to solve problems related to the weather.

**LEVELS OF ATTITUDES, SKILLS & TECHNOLOGY EXPECTED AT GRADES K - 2**

**ATTITUDES:**

**Students should be encouraged to:**

<b>Curiosity:</b>	<ul style="list-style-type: none"><li>✓ Ask questions about objects and events.</li><li>✓ Find out more about events and objects on their own.</li></ul>
<b>Inventiveness:</b>	<ul style="list-style-type: none"><li>✓ Suggest new ways of doing things.</li></ul>
<b>Respect For Evidence</b>	<ul style="list-style-type: none"><li>✓ Explain their results and conclusions.</li><li>✓ Listen to other students' results and explanations.</li></ul>
<b>Persistence</b>	<ul style="list-style-type: none"><li>✓ Complete activities.</li><li>✓ Persist at tasks.</li></ul>
<b>Respect For Living Things</b>	<ul style="list-style-type: none"><li>✓ Show sensitivity to living things.</li></ul>
<b>Cooperation</b>	<ul style="list-style-type: none"><li>✓ Share with others.</li><li>✓ Work together with others.</li></ul>
<b>Concern For Safety</b>	<ul style="list-style-type: none"><li>✓ Observe safety instructions.</li></ul>

**SKILLS:**

**In developing their skills of inquiry, problem solving and design, the students are expected to:**

<b>Observing</b>	<ul style="list-style-type: none"> <li>✓ Use as many senses as are appropriate and safe to gather information.</li> <li>✓ Identify differences and similarities between objects and events.</li> <li>✓ Identify sequence in events.</li> </ul>
<b>Measuring</b>	<ul style="list-style-type: none"> <li>✓ Use simple measuring instruments or models of measuring instruments. At first use comparative terms such as bigger, smaller and later use actual figures.</li> </ul>
<b>Manipulating</b>	<ul style="list-style-type: none"> <li>✓ Set up simple experiments to compare results.</li> <li>✓ Manipulate simple equipment.</li> </ul>
<b>Recording</b>	<ul style="list-style-type: none"> <li>✓ Use pictures and charts to report results.</li> <li>✓ Fill out simple tables to report results.</li> </ul>
<b>Classifying</b>	<ul style="list-style-type: none"> <li>✓ Group objects according to one or two criteria.</li> </ul>
<b>Communicating</b>	<ul style="list-style-type: none"> <li>✓ Talk freely about their activities and the ideas they have, with or without making a written record.</li> <li>✓ Use appropriate vocabulary to describe their observations.</li> <li>✓ Listen to others' ideas and look at their results.</li> <li>✓ Report events by using demonstrations, role play, simple drawings, paintings and simple sentences.</li> </ul>
<b>Inferring</b>	<ul style="list-style-type: none"> <li>✓ Notice patterns in simple measurements and events.</li> </ul>
<b>Interpreting data</b>	<ul style="list-style-type: none"> <li>✓ Discuss what they find out in response to questions.</li> </ul>
<b>Experimenting</b>	<ul style="list-style-type: none"> <li>✓ Freely ask a variety of questions and suggest how they might be answered.</li> <li>✓ Suggest how they could investigate to find out answers to questions.</li> </ul>
<b>Predicting</b>	<ul style="list-style-type: none"> <li>✓ Attempt to make predictions (even if not based on patterns).</li> </ul>
<b>Problem Solving</b>	<ul style="list-style-type: none"> <li>✓ Suggest solutions to simple problems.</li> </ul>
<b>Designing</b>	<ul style="list-style-type: none"> <li>✓ Construct models either by following instructions or by using their own designs.</li> <li>✓ Select appropriate material to make models and gadgets.</li> </ul>

## TECHNOLOGY

<u>Technological Methods</u>	<ul style="list-style-type: none"><li>✓ Given problems, the students will be able to discuss and make simple gadgets.</li></ul>
<b>Nature Of Technology</b>	<ul style="list-style-type: none"><li>✓ Realize that people use natural things and also make other things from them.</li><li>✓ Realize that they can design and make things which may be different from what others make.</li><li>✓ Share information with others.</li><li>✓ Realize that safety is important in using tools and making things.</li></ul>
<u>Use Of Technology</u>	<ul style="list-style-type: none"><li>✓ Appreciate the use of devices, tools and structures made by humans in the home and community.</li><li>✓ Appreciate the advantages of using these products.</li><li>✓ Realize that human-made things can pollute the environment.</li></ul>

## UNIT: EARTH'S WEATHER (GRADE K)

### DURATION: 4 Lessons

### OBJECTIVES

Students should be able to:

1. Observe different types of weather - sunny, rainy, cloudy and windy.
2. Observe changes in weather patterns over a specific period of time.
3. Make weather charts, using pictures, to illustrate daily weather changes.
4. Discuss how the different types of weather affect people's activities.
5. Design and make models of things used to solve problems related to the weather.

### PROCESS SKILLS

Observing  
Recording  
Communicating  
Interpreting data  
Predicting

### ATTITUDES

Curiosity  
Integrity in recording and observing

### MATERIALS

Paper  
Crayons  
Pencils  
Bristol board / cardboard / manila  
Pictures of different weather conditions  
Pictures of weather symbols  
Modelling Clay

### CONTENT SUMMARY

- When we look outside we can observe the weather.
- Weather can be sunny, rainy, windy or cloudy.
- The clouds help us to describe how the weather will be.

- dark, low clouds can be a sign of rain, or a clear blue sky is an indication of fair weather.
- Weather can change over a period of time.
- The kinds of weather can affect what we do, the kinds of activities we take part in and the clothes we wear.
- We use sunglasses, hats and umbrellas to protect us from the sun, raincoats and umbrellas to protect us from rain. People have made all of these things to solve problems related to the weather.

## ***Suggested Activities***

### 1. Observing the Weather

- Take students outside to observe the weather, making particular reference to the sky, clouds, sun, wind, etc. Encourage lively discussion.
- Allow students to describe the objects in the sky (sun, moon, clouds) and to identify differences and similarities between objects in the sky.
- Allow students to draw and colour a picture of the sky.
- Help students to describe the weather of the day (sunny, rainy, cloudy or windy).

### 2. Making Weather Charts

- Let students record the daily weather over a period of time (e.g. a week). They use simple symbols to record their observations.
- Observe when the weather changes and encourage predictions of outcomes.
- Name different types of weather.
- Let students discuss various activities they take part in during certain weather conditions.
- Allow students to draw and colour pictures about the weather.

3. *Making models related to the weather*

- Make models of the objects in the sky.
- Make models of things and structures humans use to solve problems related to weather (e.g. umbrellas, sunglasses).

4. *Integration with other subjects*

- Play weather games.
- Sing or recite poems about the weather. (Music and Language Arts)
- Make models of objects (Art & Craft)

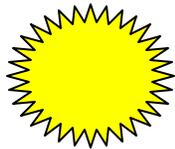
## ASSESSMENT

1. *Observing the weather*

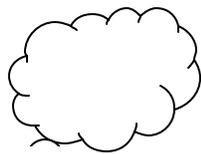
Match the symbols to the type of weather they represent.



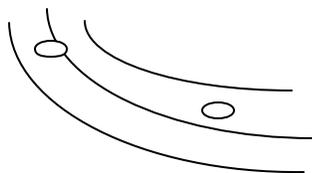
Windy



Cloudy



Sunny



Rainy

1. Circle the name of the kind of day shown in the picture.



Sur  
Rai  
Clo

2. Making Weather Charts

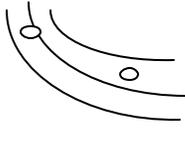
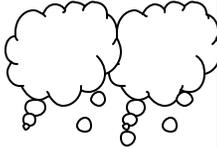
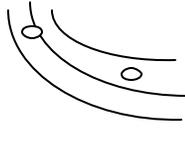
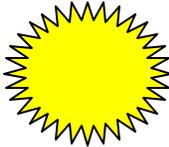
**Data Interpretation**

Study the weather chart below (or use ones made by students)

Put X on the sunny day.

Circle the cloudy day.

Colour the day. Which day was rainy and cloudy.

				
Monday	Tuesday	Wednesday	Thursday	Friday

**Oral Assessment**

Describe some activities, which can be done on a

- a) a sunny day
- b) a rainy day

Describe what we can carry or use to assist us on a

- a) sunny day
- b) rainy day

3. Making Models related to the Weather

Using models or pictures of structures related to the weather - umbrellas, hats, sunglasses, raincoats, students take turns holding up their structure, saying what it represents and in what type of weather it will be useful.

Students are encouraged to talk freely about their model or picture while the others students are encouraged to listen.

## **ASSESSMENT CHECKLIST**

### **Earth's Weather**

Scoring rubric indicating understanding of concepts, and development of skills and attitudes

- 1 not at all
- 2 partially
- 3 fully

**NAME OF STUDENT** .....

<b>CONCEPTS</b>	SCORE
Names different kinds of weather	
Illustrates kind of weather effectively	
States and names activities for different kinds of weather	
Associates kinds of weather with atmospheric appearance.	
<b>PROCESS SKILLS</b>	
Ability to a) observe (e.g. objects in the sky)	
b) record (e.g. using pictures and diagrams)	
c) communicate (e.g. using appropriate vocabulary)	
d) predict (e.g. the next day's weather)	
e) interpret data (e.g. on weather charts)	
<b>ATTITUDES</b>	
a) Shows interest and curiosity	
b) Integrity in recording	
c) Does assigned tasks	
d) Shares tasks/materials with others	

## UNIT: EARTH'S WEATHER (GRADE 1)

### DURATION: 6 Lessons

### OBJECTIVES

Students should be able to:

1. Predict weather patterns.
2. Construct graphs to illustrate weather patterns over a period of time.
3. Discuss how the different types of weather affects one's activities.
4. Identify clothing, structures, and devices that humans make to solve problems related to the weather.
5. Differentiate between hot and cold without using a thermometer.
6. Discuss what a thermometer is and for what it is used.
7. Identify and record the direction from which the wind is blowing at different periods.
8. Design and construct a simple wind vane (with the four basic cardinal points) to demonstrate wind direction.

### PROCESS SKILLS

Observing  
Recording  
Communicating  
Measuring  
Predicting  
Manipulating  
Interpreting  
Inferring

### ATTITUDE

Curiosity  
Inventiveness  
Integrity in observing and reporting  
Aware of the use of technology in weather

### MATERIALS

Radio  
Television  
Thermometer  
Wind sock/wind vanes  
Materials for making weather instruments

## CONTENT SUMMARY

- Different weather conditions affect our activities; hence it is useful to predict the weather.
- People have developed ways to study and predict the weather.
- People who study the weather are called meteorologists.
- We can listen to our local weather T.V. channel or radio station for the weather report.
- The reports help us to plan activities and prepare for storms or hurricanes.
- Weather can change at different times of the year. In the Caribbean we experience a dry season, and a wet season. In some other countries there are four seasons.
- People build strong houses and make shutters to protect themselves from storms. People have different types of clothing for dry and rainy weather. People use sunglasses to protect their eyes from the sun.
- We can use different instruments to measure elements of the weather.
- Temperature affects the weather.
- A thermometer is used to measure how hot or cold the weather is (temperature).

Wind direction and speed affect the weather

- Wind vanes help to tell us from which direction the wind is blowing.
- By observing weather patterns, we can sometimes predict the weather.
- An anemometer measures the speed of the wind.

## SUGGESTED ACTIVITIES

- Identify components of the weather.
- Describe kinds of weather experienced in the Caribbean, based on students' experiences.
- Using students' experiences, refer to the extreme forces of weather; e.g. rain, wind or thunderstorms, heat waves, etc.
- Discuss the effects of weather on humans. Allow students to discuss freely, referring to their experiences.
- Provide students with a situation where they can listen to a weather report. Discuss what was heard.
- Introduce the term, meteorologist. Let students identify local meteorologists.
- Describe the work of a meteorologist.
- Encourage students to listen to the weather reports on the local radio or T.V., and then report to class.
- Display a variety of objects that people use in different types of weather and let students match object to type of weather. Let students identify problems people might have in different types of weather, e.g. we may get wet in rainy weather. Discuss how technology has enabled people to prepare for different weather conditions, including disasters such as hurricanes.
- Observe the thermometer (SAFETY: USE ONLY ALCOHOL THERMOMETERS). Prepare experiment with ice and hot water where students may observe how the thermometer works.
- Investigate and operationally define the thermometer.
- Allow thermometer to remain in class over a period of time to allow students to investigate and experiment on their own, and record daily temperature.
- Take students out on a windy day. Observe objects being blown by the wind. Infer the direction from which the wind is blowing by observing the movement of objects.
- Construct simple wind vanes or windsocks to determine wind direction.

- Allow students to experiment with various materials on the playground to indicate wind direction.

## ASSESSMENT

Circle the best answer.

1. A meteorologist studies the  
a) earthquakes                      b) news                      c) weather
2. A very strong wind in the Caribbean is called  
a) air                      b) breeze                      c) hurricane
3. A thermometer can measure  
a) temperature                      b) wind direction                      c) wind speed
4. If I want to know where the wind is blowing from, I can look at the  
a) thermometer                      b) weather                      c) wind sock
5. When a thermometer is placed in cold water, the liquid in it will  
a) go down                      b) go up                      c) not move

### ***Drawing***

Draw a wind sock on

- a) a windy day
- b) on a calm day

Draw some trees on

- a) a stormy day
- b) a calm day

Draw clothes on the line

- a) on a windy day
- b) on a calm day

***Communication***

Listen to the weather report. Report on some of the news that you heard about the weather.

**ASSESSMENT CHECKLIST**

Scoring rubric	1	poor
	2	fair
	3	good
	4	very good

**NAME** .....

<b>CONCEPTS</b>	
Describes a weather report	
Defines the term, meteorologist	
Names the seasons in the Caribbean	
Operationally defines	a) thermometer
	b) wind sock
	c) wind vane
Identifies	a) thermometer
	b) wind sock
	c) wind vane
Describes different types of weather experienced	
<b>PROCESS SKILLS</b>	
<b>Ability to</b>	a) <i>observe</i>
	b) <i>measure</i>
	c) <i>communicate</i>
	d) <i>record</i>
	e) <i>infer</i>
	f) <i>collect information</i>
<b>ATTITUDE/GROUP SKILLS</b>	
	a) commitment to accuracy
	b) accepts responsibility
	c) creativity
	d) shows responsibility
	e) co-operates with others

Unit: earth's weather (grade 2)

**DURATION: 6 Lessons**

**OBJECTIVES**

The students should be able to:

1. Draw a simple diagram to represent the water cycle.
2. Design and construct a simple rain gauge to measure rainfall.
3. Design and construct a simple anemometer to measure wind speed.
4. Take and compare measures of rainfall, temperature, wind direction and wind speed on different days.

**PROCESS SKILLS**

Observing  
Classifying  
Communicating  
Inferring  
Measuring  
Manipulating  
Designing  
Experimenting  
Recording  
Problem solving

**ATTITUDES**

Concern for safety  
Respect for evidence  
Inventiveness  
Commitment to accuracy  
Critical reflection

**MATERIALS**

Rain gauge  
Plastic cups  
Bunsen burners/lighting fluid  
Bits of various materials  
Measuring cylinders/cups

## CONTENT SUMMARY

- Water goes round and round in nature. When rain falls, the heat of the sun evaporates some of the Earth's water back into the air as water vapour. This vapour cools, condenses (forms clouds) and falls back to the Earth as rain. This process is known as the Water Cycle.
- Rainfall is measured by a rain gauge.
- An anemometer is used to measure wind speed.

## SUGGESTED ACTIVITIES

- Review components of the weather and their effect on people; hold discussion, referring to students' experiences.
- Plan an investigation as to what happens to puddles and other bodies of water during the day. Encourage students to hypothesize.
- Let students experiment in small groups, e.g.
  - Give each group two cups with identical amounts of water. Students measure and record the heights of water in each cup. They then expose the cups to the sun, one covered and the other uncovered. At intervals, students observe and measure the height of water remaining in each cup. Record results in a table or by drawing. Discuss findings with students.
- Demonstrate the process of condensation by using cups filled with warm water covered with plastic wrap. Allow students to observe and discuss appearance of plastic. Repeat process with ice cubes on plastic.
- Demonstrate the water cycle. Allow students to observe the stages: evaporation, condensation, rain droplets.
- Give students enough time to observe and discuss. (Be mindful of safety rules.)
- Associate process observed with the process occurring in nature.
- Construct a rain gauge; observe and record rainfall.

- Discuss wind and wind-speed by observing the movement of objects on playground, flags, etc.
- Construct anemometer, using bits of materials of various grades beginning from light to heavy.
- Let students use their rain gauge and anemometer to take measurements each day for a week. They record their results in an appropriate way. Encourage students to note any patterns.

## **ASSESSMENT**

Let students:

Label an illustration of a water cycle or using scrap material, construct a chart showing the water cycle.

Define operationally: a) rain gauge b) anemometer

Identify illustrations: a) rain gauge b) anemometer

### ***Design and make:***

Students use materials to construct a) rain gauge b) anemometer. Skills and attitudes such as manipulating materials, measuring, cooperation, persistence, can be assessed.

As they use weather instruments the following can be assessed:

- Measure and record rainfall over a period of time.
- Use information to construct simple graphs.
- Interpret data on a given graph.

**ASSESSMENT CHECKLIST**

- Scoring rubric
- 1 poor
  - 2 fair
  - 3 good
  - 4 very good

**NAME** .....

<b>CONCEPTS</b>		
States the processes in the water cycle		
Labels an illustration of the water cycle		
Names and define each process in the water cycle	a) evaporation	
	b) condensation	
Names instruments		
Operationally defines instruments		
<b>PROCESS SKILLS</b>		
Ability to	a) observe	
	b) measure	
	c) record	
	d) design	
	e) infer	
	f) manipulate materials	
	g) solve problems	
<b>ATTITUDE/GROUP SKILLS</b>		
	a) Accepts responsibility	
	d) Participates in discussions	
	e) Takes initiative	
	f) Co-operates in a group	

Module 2  
Earth's weather  
Grades 3 - 4

## **GENERAL OBJECTIVES**

The students should be able to:

1. Recognize the elements of the weather.
2. Understand the water cycle and its effects.
3. Construct and use instruments to measure elements of the weather.
4. Keep accurate records of weather and interpret them.

## **SPECIFIC OBJECTIVES**

The students should be able to:

1. Explain what is weather.
2. List the elements of weather (air/wind, clouds, water vapour, precipitation, temperature).
3. Describe how clouds are formed.
4. Discuss the useful and harmful effects of the wind.
5. Use a compass to determine wind direction.
6. Design and construct a wind vane to observe wind direction (Must have at least 4 cardinal points).
7. Design and construct an anemometer to measure wind speed.
8. List the two main sources of water in nature's water cycle (ground water and surface water).
9. Observe the evaporation and condensation of water.
10. Identify the evaporation and condensation of water.
11. Identify the heat source that powers nature's water cycle.
12. Design and construct a model to represent the water cycle.
13. Explain how temperature affects weather (evaporation, condensation and air movements).
14. Use a thermometer to measure temperature.
15. Record weather using standard symbols.

16. Summarize and represent data from their recordings of the weather by using simple graphs.
17. Identify different types of weather conditions by examining weather charts.

**LEVELS OF ATTITUDES, SKILLS & TECHNOLOGY EXPECTED AT  
GRADES 3 - 4**

**ATTITUDES:**

**Students should be encouraged to:**

<b>Curiosity:</b>	<ul style="list-style-type: none"> <li>✓ Ask questions about objects and events.</li> <li>✓ Find out more about events and objects on their own.</li> </ul>
<b>Inventiveness:</b>	<ul style="list-style-type: none"> <li>✓ Suggest new ways of doing things.</li> <li>✓ Use equipment in novel ways.</li> </ul>
<b>Respect For Evidence</b>	<ul style="list-style-type: none"> <li>✓ Explain their results and conclusions using some evidence.</li> <li>✓ Listen to other students' results and explanations.</li> <li>✓ Begin to recognize when conclusions do not fit the evidence.</li> </ul>
<b>Persistence</b>	<ul style="list-style-type: none"> <li>✓ Complete activities.</li> <li>✓ Persist at tasks.</li> </ul>
<b>Respect For Living Things</b>	<ul style="list-style-type: none"> <li>✓ Show sensitivity to living things.</li> </ul>
<b>Cooperation</b>	<ul style="list-style-type: none"> <li>✓ Share with others.</li> <li>✓ Work together with others.</li> <li>✓ Accept responsibilities.</li> </ul>
<b>Concern For Safety</b>	<ul style="list-style-type: none"> <li>✓ Observe safety instructions.</li> </ul>

<b>SKILLS:</b>	<b>In developing their skills of inquiry, problem solving and design, the students are expected to:</b>
<b>Observing</b>	<ul style="list-style-type: none"> <li>✓ Use as many senses as are appropriate and safe to gather information.</li> <li>✓ Identify differences and similarities between objects and events.</li> <li>✓ Identify sequence in events.</li> </ul>
<b>Measuring</b>	<ul style="list-style-type: none"> <li>✓ Use simple measuring instruments or models of measuring instruments. At first use comparative terms such as bigger, smaller and later use actual figures.</li> </ul>
<b>Manipulating</b>	<ul style="list-style-type: none"> <li>✓ Set up simple experiments to compare results.</li> <li>✓ Manipulate simple equipment.</li> </ul>
<b>Recording</b>	<ul style="list-style-type: none"> <li>✓ Use pictures and charts to report results.</li> <li>✓ Fill out simple tables to report results.</li> </ul>
<b>Classifying</b>	<ul style="list-style-type: none"> <li>✓ Group objects according to several criteria.</li> </ul>
<b>Communicating</b>	<ul style="list-style-type: none"> <li>✓ Talk freely about their activities and the ideas they have, with or without making a written record.</li> <li>✓ Use appropriate vocabulary to describe their observations.</li> <li>✓ Listen to others' ideas and look at their results.</li> <li>✓ Report events by using demonstrations, role play, simple drawings, paintings and paragraphs.</li> <li>✓ Use bar graphs, pictures, tables and charts to report results.</li> <li>✓ Use books and other sources to find information.</li> </ul>

## SKILLS CONT'D

<b>Inferring</b>	<ul style="list-style-type: none"> <li>✓ Notice patterns and relationships in simple measurements and events.</li> </ul>
<b>Interpreting data</b>	<ul style="list-style-type: none"> <li>✓ Discuss what they find out in response to questions.</li> <li>✓ Compare their findings with their predictions.</li> <li>✓ Notice changes when one variable is changed.</li> </ul>
<b>Experimenting</b>	<ul style="list-style-type: none"> <li>✓ Freely ask a variety of questions and suggest how they might be answered.</li> <li>✓ Suggest how they could investigate to find out answers to questions.</li> <li>✓ Have some idea of the variable that has to be changed or what different things are to be compared in an investigation.</li> <li>✓ Suggest equipment, materials and procedure for conducting investigations.</li> </ul>
<b>Predicting</b>	<ul style="list-style-type: none"> <li>✓ Attempt to use evidence in making predictions.</li> </ul>
<b>Hypothesizing</b>	<ul style="list-style-type: none"> <li>✓ Attempt to explain things that are consistent with evidence.</li> <li>✓ Suggest how something may have happened.</li> </ul>
<b>Problem Solving</b>	<ul style="list-style-type: none"> <li>✓ Suggest solutions to simple problems.</li> </ul>
<b>Designing</b>	<ul style="list-style-type: none"> <li>✓ Construct models either by following instructions or by using their own designs.</li> <li>✓ Select appropriate material to make models and gadgets.</li> <li>✓ Formulate problems, do appropriate research, and devise solutions.</li> <li>✓ Select appropriate material to make models and gadgets.</li> <li>✓ Evaluate their own designs using simple criteria.</li> </ul>

## TECHNOLOGY

<p><b>Technological Methods</b></p>	<ul style="list-style-type: none"> <li>✓ Students will be able to formulate problems, do appropriate research and devise solutions (e.g. construct gadgets).</li> </ul>
<p><b>Nature Of Technology</b></p>	<ul style="list-style-type: none"> <li>✓ Look at past inventions in their historical context.</li> <li>✓ Understand that products are replicable.</li> <li>✓ Understand that others may be working on the same idea.</li> <li>✓ Realize that <i>they can use scientific knowledge in doing technology</i> and that technology helps to develop reliable scientific information.</li> <li>✓ Understand the importance of precision and safety in developing new products.</li> <li>✓ Understand that technology is novel and creative.</li> <li>✓ Understand that if the people in a country are creative and innovative, their country can progress.</li> <li>✓ <i>Understand that people use processes involving living things (Biotechnology) and materials (Production Technology) to satisfy their needs.</i></li> </ul>
<p><b>Use Of Technology</b></p>	<ul style="list-style-type: none"> <li>✓ Appreciate the use of devices, tools and structures made by humans in the home and community.</li> <li>✓ Appreciate the advantages of using these products.</li> <li>✓ Realize that human-made things can pollute the environment.</li> <li>✓ Look at advantages and disadvantages to help them make decisions of what is the best technology that can be used in a particular situation.</li> <li>✓ Realize that people may abuse and misuse technology.</li> <li>✓ Understand that technology may have unintended consequences.</li> </ul>

## UNIT: THE EARTH'S WEATHER (GRADE 3)

### DURATION: 2 Lessons

### OBJECTIVES

The students should be able to:

1. Explain what is weather.
2. List elements of weather (air/wind, clouds, water vapour, precipitation, temperature).

### MATERIALS

Worksheets

### PROCESS SKILLS

Communicating

Observing

Experimenting

### CONTENT SUMMARY

#### Weather:

- **Weather** is the condition of the atmosphere at a certain place and time.
- The **atmosphere** is a blanket of air that surrounds the earth. The atmosphere determines the weather. The Earth's weather occurs in the thin layer of the atmosphere that is closest to the earth.

### Elements of weather:

- There are many elements of weather. They include: temperature, water vapour, precipitation, clouds and air/wind.
- Heat from the **sun** warms up the earth's surfaces. Some surfaces are warmed more than others.
- **Air temperature** and the amount of **water vapour** in the air vary and have a great effect on weather.
- **Precipitation** is any form of water that forms in the air or on the cold ground. It occurs in a variety of forms: rain, dew.

## TEACHING STRATEGIES

Discussion

Inquiry

Discovery

Question and Answer

## SUGGESTED ACTIVITIES

### 1) Finding out about the weather:

The teacher will give students a handout with the following questions:

- What is the weather today?  
Sunny ?      Cloudy ?      Rainy ?
- How do you feel?  
Cool ?      Hot ?      Very hot ?
- I can see \_\_\_\_\_ cloud/s.  
No ?      Few ?      Many ?
- The clouds are \_\_\_\_\_.  
White ?      Grey ?      Dark ?

2) Making predictions:

Use the worksheet below to record weather for a few days and then predict the weather for the following day. Compare your predictions to the real weather on the following day using a newspaper or listening to the radio. Draw the following symbols to show the weather for each day: umbrella - rainy day; sun - sunny day; kite - windy day, cloud - cloudy day.

	Morning	Midday	Afternoon
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			

## ASSESSMENT

Sample question:

1. As Mary went out to play, she noticed the following conditions outside:

- Strong wind
- Grey clouds
- Almost no sunlight present
- Cold temperature

a) Is it a good idea for her to stay out and play?

---

b) What kind of weather did she see?

---

---

---

Sample answer:

1. a) No, she should not stay outside and play.

b) The weather conditions indicated that rain was approaching.

## **WIND (ONE ELEMENT OF WEATHER)**

**DURATION: 4 Lessons**

### **OBJECTIVES**

Students should be able to:

1. Discuss the useful and harmful effects of the wind.
2. Use a wind vane to determine wind direction.
3. Design and construct a wind vane, with four cardinal points, to observe wind direction.
4. Design and construct an anemometer to measure wind speed.

### **SCIENCE PROCESSES**

Observing

Measuring

Communicating

Interpreting data

Making and using models

Collecting, Recording, and Interpreting Data

Inferring

### **TEACHING STRATEGIES**

Project Approach

Guided Discovery

Experimenting

Cooperative Learning

## **MATERIALS**

### *A. How Fast the Wind Blows (Building an Anemometer)*

#### Materials:

- Goggles
- staple
- plastic straws
- small paper cups
- tape
- crayon
- straight pin
- pencil with a new eraser
- timer

## **OR**

#### Materials:

- plastic bottle
- stiff wire
- sand
- 4 empty juice containers
- pen covers
- 2 pieces of stick
- nail
- hammer
- plasticine
- 8 thumbtacks.

B. A Windy Day (Building a Wind Vane)

- Goggles
- wooden board with hole in centre
- marker
- dropper
- middle section from plastic bottle (1 l)
- wire hanger (with hook straightened)
- tape
- cardboard
- pair of scissors
- magnetic compass

**OR**

- Bottle
- stiff wire
- sand
- 2 pieces of cardboard
- straw
- knife
- plasticine
- pen top
- paper base
- pointer with arrow head

C. Making a Wind Sock

Materials:

- piece of manila file folder
- a large paper clip
- pieces of kite string
- pieces of crepe paper
- construction paper
- hole punch
- stapler

## CONTENT SUMMARY

### Wind:

- **Wind** is the movement of air over the Earth's surface.



### Useful and Harmful Effects of the Wind:

#### A. Useful-

- Wind helps in seed dispersal (scattering) by blowing seeds from place to place. Example is silk cotton.
- Wind provides transportation by sea/water. The wind allows sailboats to move as the sails trap the wind to push the boat forward.
- Aeroplanes move with the help of the wind. Windmills use the wind energy to produce electricity by turning generators.
- Wind builds up the land when sediments from one area are deposited in another. Piles of sand are deposited, forming sand dunes on beaches and in deserts.
- Wind dries clothes by blowing, and carrying off the water vapour from around the wet clothes.



#### B. Harmful-

- Strong winds may blow down trees, and wooden houses and signs. These strong winds usually occur in storms or hurricanes.
- The wind blows loose sand and soil away, resulting in a wearing away of the land.

## Wind Direction

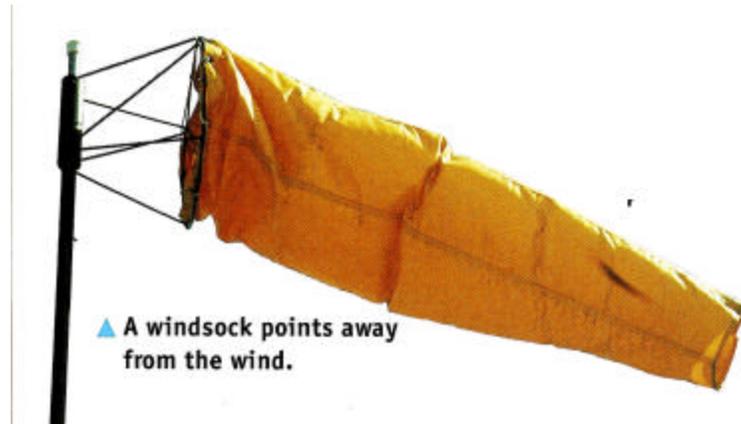
To find the direction in which wind is blowing, two instruments may be used.

- The first is the **wind vane** (Figure 1) is a device which shows the direction from which the wind is blowing. Common wind vanes are shaped like a long arrow with a tail. When the wind blows, the arrow points into the wind. For example, if the arrow points east, the wind is an east wind.
- A **windsock** (Figure 2) is another device used to show wind direction. It consists of a cloth bag that is opened at both ends and is hung on a pole. Air enters the wide end of the windsock and causes the narrow end to point away from the direction from which the wind is blowing. Windsocks are usually found at airports.

A wind vane points into the wind. On this wind vane, the head of the horse points into the wind.



Figure 1. A Wind Vane



## Wind Speed

Figure 2. A Windsock

## Wind Speed

- The device to measure the wind speed is called an **anemometer**. It consists of cups on spokes attached to a pole. (See Figure 3)

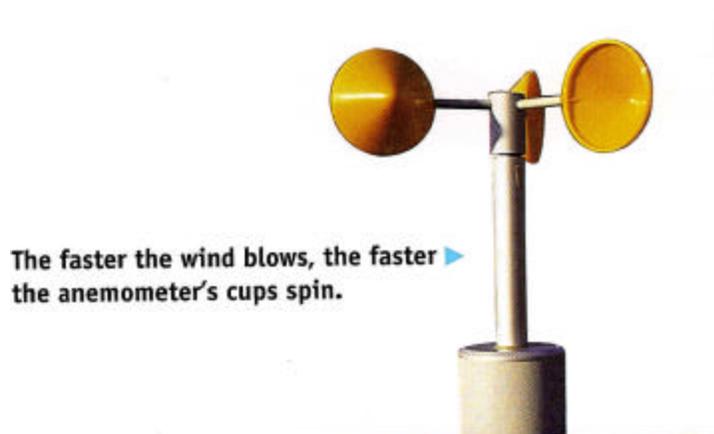


Figure 3. An anemometer.

- We can also tell the speed of the wind by observing the movement of things around us. The Beaufort Scale helps to determine the wind speed without the anemometer.

The Beaufort Scale is used to measure how strong the wind is blowing. Wind speed may be estimated using this scale.

<b>Wind Speed MPH</b>	<b>World Meteorological Organization (WMO) Description</b>	<b>Wind Effects on Land</b>
Under 1	Calm	Clam, smoke rises vertically
1 – 3	Light air	Smoke drift indicates wind direction, still wind vanes
4 – 7	Light breeze	Wind felt on face, leaves rustle, vanes begin to move
8 – 12	Gentle breeze	Leaves and small twigs constantly moving, light flags extended
13 – 18	Moderate breeze	Dust, leaves, and loose paper lifted, small tree branches move
19 – 24	Fresh breeze	Small trees leaf begin to sway
25 – 31	Strong breeze	Larger tree branches moving, whistling in wires
32 – 38	Near gale	Whole trees moving, resistance felt walking against wind
39 – 46	Gale	Whole trees in motion, resistance felt walking against wind
47 – 54	Strong gale	Slight structural damage occurs, slate blows off roofs
55 – 63	Storm	Seldom experienced on land, tree broken or uprooted, "considerable structural damage"
64 – 72	Violent storm	Very rarely experienced; accompanied by wide spread damage
73 and over	hurricane	Massive and wide spread damage to structures

Table C.1. The Beaufort Scale (modified version)

## SUGGESTED ACTIVITIES

### 1. *Useful and harmful effects of the wind*

Let students brainstorm as many effects of the wind as they can. They then categorize them as useful or harmful

### 2. *How Fast the Wind Blows (Building an Anemometer)*

Group work (4-5 students per group)

Teacher challenges students to suggest how they could tell how fast the wind is blowing. They discuss signs that may indicate the speed of the wind. Teacher then introduces students to the Beaufort scale.

One model of an anemometer can be made as follows:

#### Procedure:

- ❑ Staple one end of a plastic straw to the outside of a paper cup, near the rim. Do the same thing with three other straws and paper cups. Each straw should be sticking out to the right of its cup.
- ❑ Place two cups on their sides with the straws pointed toward each other. The open ends of the cups should be facing in opposite directions. Overlap the tips of the straws about 1 cm and tape them together.
- ❑ Repeat step 2 with the other two cups. Then crisscross the two pairs of straws together at their midpoints. Mark the bottom of one cup with an X.
- ❑ Insert a straight pin through the centre of the cross and into the top of a pencil eraser. (CARE!) Don't push the pin all the way in. Your anemometer is complete.
- ❑ Test your anemometer by holding the pencil and blowing into the cups. The cups should spin freely. You can watch for the cup marked X on the bottom to tell when the anemometer has made one complete spin.

- Make a chart like the one below. Take your anemometer outside. Count how many times it spins in one minute. Record the number of spins at different times of day or at the same hour each day of the week. Record other observations about weather conditions at the same time.

Date	Time	Spins in 1 minute	Weather conditions

Safety Precautions:

Teacher should supervise the use of the stapler.

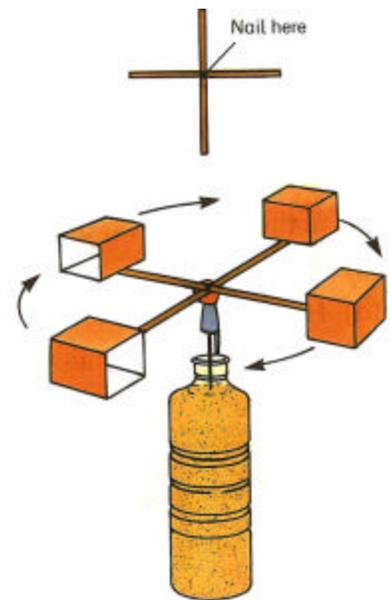
Teacher should insert the straight pin.

Activity:

Group work (4-5 students per group)

Procedure:

Use materials to make an anemometer. Teacher should encourage students to design their own anemometer.



*3. A Windy Day (Building a Wind Vane)*

Group work (4-5 students per group)

Materials:

Students' choice

Procedure:

- a. Students will use the materials to construct a wind vane. (Note: a picture of a wind vane should be presented before assigning this task).
- b. Students will use their wind vane to record wind direction at different times of the day.
- c. Students will compare wind direction under different weather conditions.

*4. Making a Windsock*

Group work (3-4 students per group)

(See materials listed above)

Procedure:

1. Show students a picture of the wind sock.
2. Place students into groups.
3. Ask students to make a windsock using the materials provided.

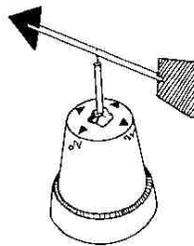
**ASSESSMENT**

Sample Questions:

For the following questions, circle the correct answer.

1. What can we use the instrument below to measure?

- (a) Air pressure
- (b) Temperature
- (c) Wind direction
- (d) Wind speed



3. A windsock and a wind vane show \_\_\_\_\_

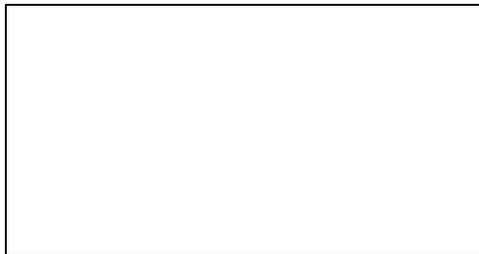
- (a) air pressure
- (b) temperature
- (c) wind direction
- (d) wind speed

4. A wind of 120 miles per hour is a \_\_\_\_\_.

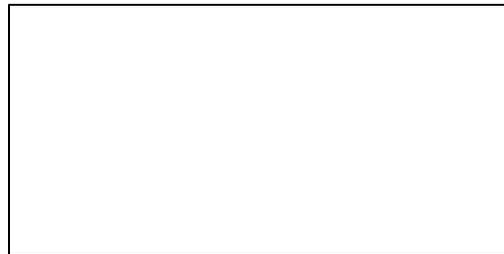
- (a) gentle breeze
- (b) hurricane
- (c) storm
- (d) strong breeze

Part B

1. In the space below draw a windsock in a heavy wind and draw one where there is no wind blowing.

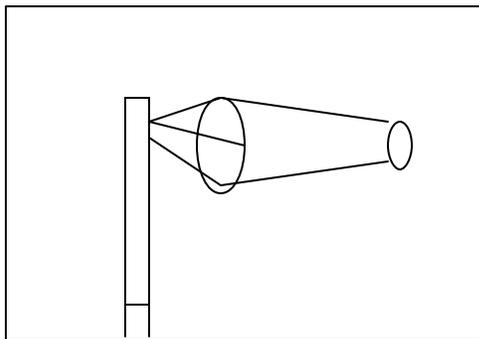


Windsock in heavy wind

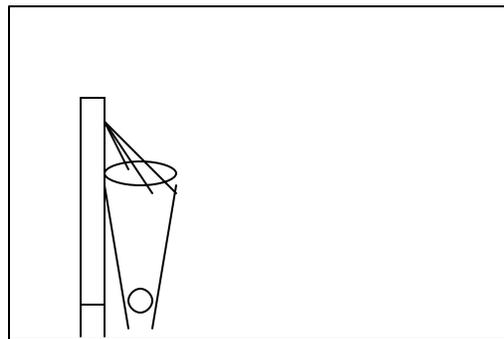


Windsock in no wind (calm)

Sample Answer for Part B



Windsock in heavy wind



Windsock in no wind (calm)

## **WATER**

### **DURATION : 4 Lessons**

### **OBJECTIVES**

Students should be able to:

1. List the two main sources of water in nature's water cycle (ground water and surface water).
2. Observe the evaporation and condensation of water.
3. Identify the evaporation and condensation of water.
4. Identify the heat source that powers nature's water cycle.

### **PROCESS SKILLS**

Observing  
Recording  
Measuring  
Experimenting  
Communicating  
Interpreting data

### **TEACHING STRATEGIES**

Discussing  
Questioning  
Demonstration Laboratory

### **MATERIALS**

Activity 1: Finding out how water changes from a gas to a liquid

- A clear plastic cup
- 5 ice cubes
- cold water
- food colouring
- white napkin

Activity 2 : Changing water from a liquid to a gas

- *small pan or test tube*
- *pot or test tube holder*
- *dropper*
- *bunsen burner or other heat source*

**Extension:** Does the amount of water matter?

- *2- 150 ml beakers or two clear drinking glasses*
- *labels*
- *ruler*

## CONTENT SUMMARY

- All living things need water.
- A source of water which already exists on the land, is called **surface water**. Examples are ponds, streams, rivers, oceans and lakes.
- A source of water that is found under the ground is called **ground water**.
- The water on Earth is constantly recycled in a process called the water cycle. As water goes through this cycle we notice changes in our weather.
- The **water cycle** is the continual evaporation and condensation of water.
- **Evaporation** occurs when liquid water is heated and turns to a gas. The gas is invisible and is called water vapour.

Examples:

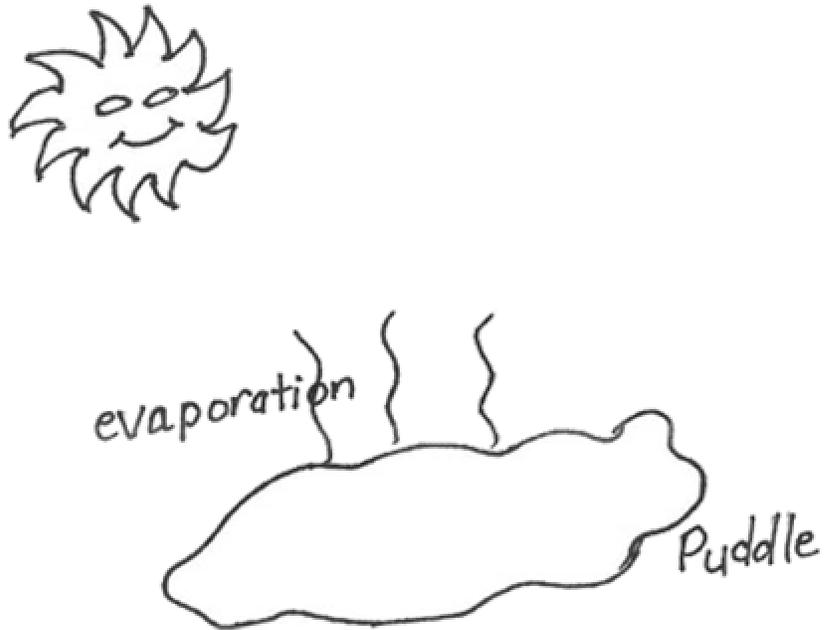


Fig 1: The sun heats the water. The water goes into the air; as a gas water vapour is invisible.

Fig 2: The water from wet clothes evaporates.



Examples:

- **Condensation** occurs when a gas (water vapour) cools and changes back to a liquid.

The water vapour in the air cools and turns into tiny droplets (condenses). Sometimes these drops of water collect on plants and is called dew.

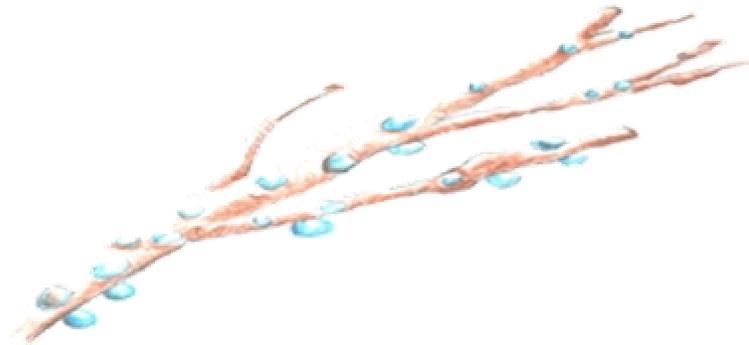


Fig. 3: Dew drops on a plant

The Water Cycle:

- The sun is the main engine which drives the water cycle. Heat from the sun evaporates water from the surface of the oceans, ponds, lakes, and rivers into a gas called water vapour. The water vapour rises into the air. As it rises the water vapour cools and condenses (changes into tiny droplets of liquid water) to form clouds. The water falls back to the earth in the form of rain.

Although surface water (water already on land) and ground water (water underground) are the two main sources of water in nature's water cycle, there is water in the air.

This picture below shows how evaporation occurs. The water vapour rises into the atmosphere and condenses to form clouds. Eventually the water returns to the Earth as rain.

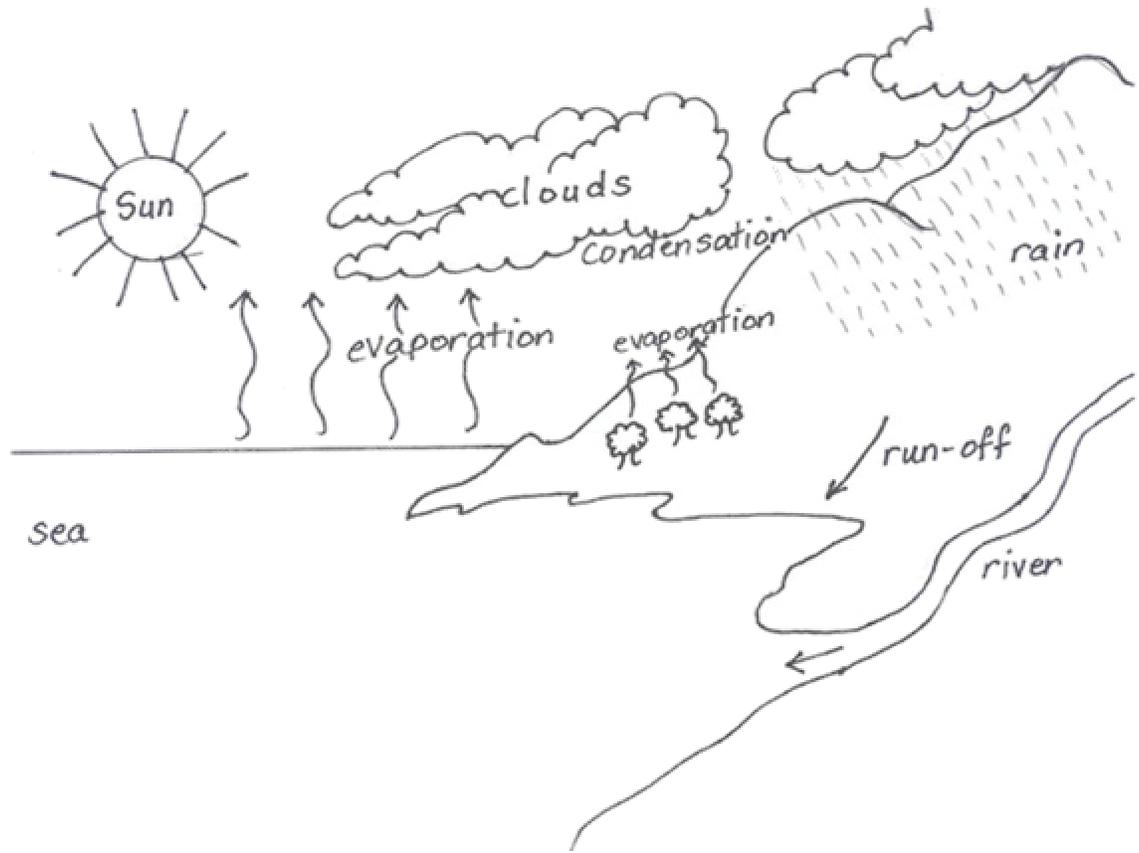


Fig 4: The Water Cycle

## SUGGESTED ACTIVITIES

### a) Finding out how water changes from a gas to a liquid

This activity allows the students to develop further the skills of observing, communicating and interpreting. Questions are provided to assist in stimulating meaningful discussion in an attempt to bring about higher order thinking skills.

#### **Students should work in pairs.**

(See materials listed above)

#### Instructions:

1. Fill the cup with cold water and ice cubes.
2. Add two drops of food colouring to the water and ice cubes.

3. Let the cup sit undisturbed for 5 minutes or until there are drops of water on the outside of the cup.
4. Wipe the outside of the cup with the white paper napkin. Record what happens.

Questions:

- a. Where do you think the water on the outside of the cup came from?
- b. How do you know?
- c. What caused the water drops to form on the outside of the glass?

#### b) Changing Water from a Liquid to a Gas

It may be best to use this activity as a demonstration.

(See materials listed above)

Instructions:

- Using the dropper, place a drop of water in the test tube or several drops in the pan.
- Light the bunsen burner or other heat source.
- Heat the container or test tube (about 3 cm above the flame).
- Move the container/test tube back and forth over the flame until the drop(s) disappear/s.
- Turn off the heat.

This activity can also be done by placing the container with the water in the sun.

Questions:

- a. What happened to the water?
- b. What is this process called?
- c. Where is the water now?

***Extension1:*** Does the amount of water matter?

(See materials listed above)

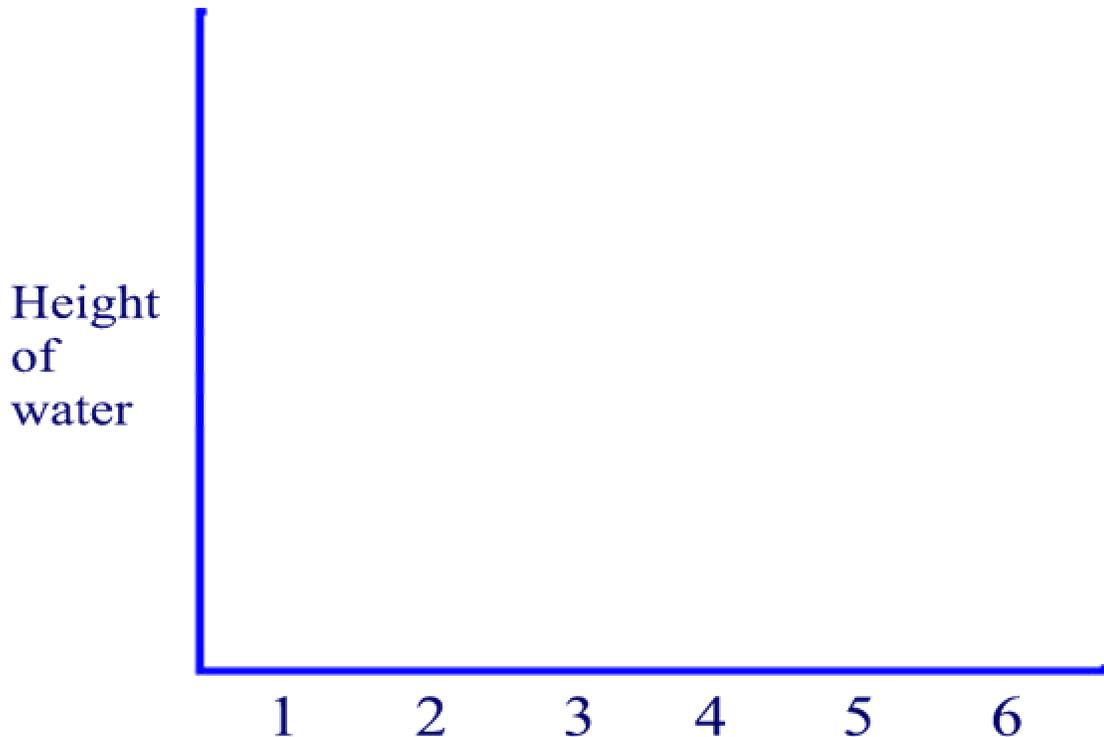
Instructions:

Students should work in pairs.

- a. Label the beakers/glasses 'A' and 'B'.
- b. Put water 10 mm deep in beaker/glass A
- c. Put water 20 mm deep in beaker/glass B.
- d. Place the beakers in the same place in the room.
- e. Every day use a ruler to measure how deep the water is in each beaker.
- f. Record your observations in a table like the one below.

Day	1	2	3	4	5	6 etc
Height of water in A in mm						
Height of water in B in mm						

- g. Repeat steps e and f until there is no water in either beaker.
- h. Draw line graphs of the results



Question:

Which is correct? Tick the right box.

True False

- |  |                          |                          |
|--|--------------------------|--------------------------|
| 1. The more water there is, the longer it takes for it to dry up.    | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The more water there is, the less time it takes for it to dry up. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The amount of water does not affect how long it takes to dry up.  | <input type="checkbox"/> | <input type="checkbox"/> |

Comparing rates of evaporation using different conditions

Teacher poses a problem or question such as: “When there are puddles of water on the road, what will make them dry up quickly?” Let students make suggestions of factors that affect the rate of evaporation.

(Several factors affect the rate of evaporation, e.g. (1) When more heat is applied, the faster evaporation occurs. Direct heating (fire) causes evaporation to occur faster than indirect heating (from the Sun). (2) Breeze affects evaporation. The stronger the breeze the faster is evaporation. (3) Surface area e.g. water in a wide shallow dish, will evaporate faster than water in a deep narrow container).

## **ASSESSMENT**

Students will be asked to design an experiment to test the rates of evaporation under different conditions. Students are expected to carry out their experiments.

Teacher should let students explain their experiments first and help them to set up **fair experiments** to investigate different conditions: e.g. Will water evaporate faster in a breeze than where the air is still? Will water evaporate faster in a flat dish or in a tall glass, etc?

**UNIT:** THE EARTH'S WEATHER (GRADE 4)

**DURATION:** 2 Lessons

### **OBJECTIVES**

Students should be able to:

1. Demonstrate how clouds are formed.
2. Describe how clouds are formed.

### **PROCESS SKILLS**

Communicating

Inquiry

Observing

Exploring

Investigating

### **TEACHING STRATEGIES**

Discussion

Role playing

Demonstration

Pictorial representation

Inquiry learning

Discovery learning

Question and Answer

### **MATERIALS**

*Activity 1:* Making cloud pictures:

- White water soluble paint
- Blue paper
- Paint brushes
- Cotton balls

- Feathers
- Glue

## CONTENT SUMMARY

- **Clouds** help us to forecast weather. Evaporation changes liquid water to water vapour as the large area of warm, moist air rises. It expands and cools. The water vapour condenses into tiny droplets of water. The droplets come together to form clouds.

Clouds are grouped by their height above the ground. Some clouds are close to the ground, some are high in the atmosphere, and some are in between.

### Clouds and Weather

- When water particles in clouds become too heavy to remain suspended in the air, they fall to the earth as rain.

## SUGGESTED ACTIVITIES

### 1) Making cloud pictures:

Let students use paint, blue paper, brushes, cotton balls and feathers to make pictures showing different types of clouds.

### 2) Kinds of Clouds:

Are there different types of clouds in the sky?

Observe clouds in the sky; draw illustrations of the different types of clouds.

Compare and discuss findings with other members of the class in relation to:

- How many different cloud shapes did you see? Did any of the clouds change shape?
- What colours were the clouds?
- Explain how you grouped clouds.

Journal writing:

1) The Weather:

- a) Give each student a table similar to the one below.
- b) Put in the month at the top.
- c) Draw a picture of the main type of cloud in the sky and state the type of weather present each day.

<b>Month:</b>						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Cloud	Cloud	Cloud	Cloud	Cloud	Cloud	Cloud
Weather	Weather	Weather	Weather	Weather	Weather	Weather
Cloud	Cloud	Cloud	Cloud	Cloud	Cloud	Cloud
Weather	Weather	Weather	Weather	Weather	Weather	Weather
Cloud	Cloud	Cloud	Cloud	Cloud	Cloud	Cloud
Weather	Weather	Weather	Weather	Weather	Weather	Weather
Cloud	Cloud	Cloud	Cloud	Cloud	Cloud	Cloud
Weather	Weather	Weather	Weather	Weather	Weather	Weather

**ASSESSMENT**

Sample questions:

1. Look at the pictures below and do the following: Describe in your own words the clouds that you see.



A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

2. Clouds are formed by:

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3. You are going on a picnic when you notice that the sky is filled with a layer of grey clouds. Should you go to the picnic or should you stay inside? Explain.

---

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## **TEMPERATURE**

### **DURATION: 3 Lessons**

### **OBJECTIVES**

The students should be able to:

1. Use a thermometer to measure temperature.
2. Design and construct a working thermometer.
3. Explain how temperature affects weather (evaporation, condensation, and air movement). *Cross reference – Energy.*

### **PROCESS SKILLS**

Observing

Communicating

### **TEACHING STRATEGIES**

Question and Answer

Co-operative learning

Experimenting

### **MATERIALS**

Activity #1: Measuring temperature

- Thermometer

Activity # 2: Formation of wind

- Aquarium
- Clamp lamp
- 100 watt light bulb
- Ice
- Splint or paper
- Matches
- Plastic wrap

## CONTENT SUMMARY

Temperature is another factor which affects weather.

- **Temperature** means how hot or cold something is. How can we tell the temperature of the air around us?
- What instrument does your mother or the nurse/doctor use when you have a fever? A thermometer is used to measure temperature.
- The unit for measuring temperature is °C or °F, although degrees Celsius° is more commonly used.

The simple mercury or alcohol thermometer:

- The thermometer is made from a glass bulb connected to a tube of glass with a numbered scale written on the outside. There is a narrow tube running from the **bulb** to the top of the thermometer; this is called the **capillary tube**.

The bulb contains mercury, which is a liquid metal (or alcohol, often dyed red so that it is visible). The mercury/alcohol inside the thermometer rises when heat is applied;



Figure A Thermometer

## SUGGESTED ACTIVITIES

### *Reading a thermometer*

- When you read the temperature on a thermometer, it should be vertical and your eyes should be level with the top of the liquid in the glass.

**Remember:** *The temperature reading is taken from the top of the column of mercury or alcohol.*

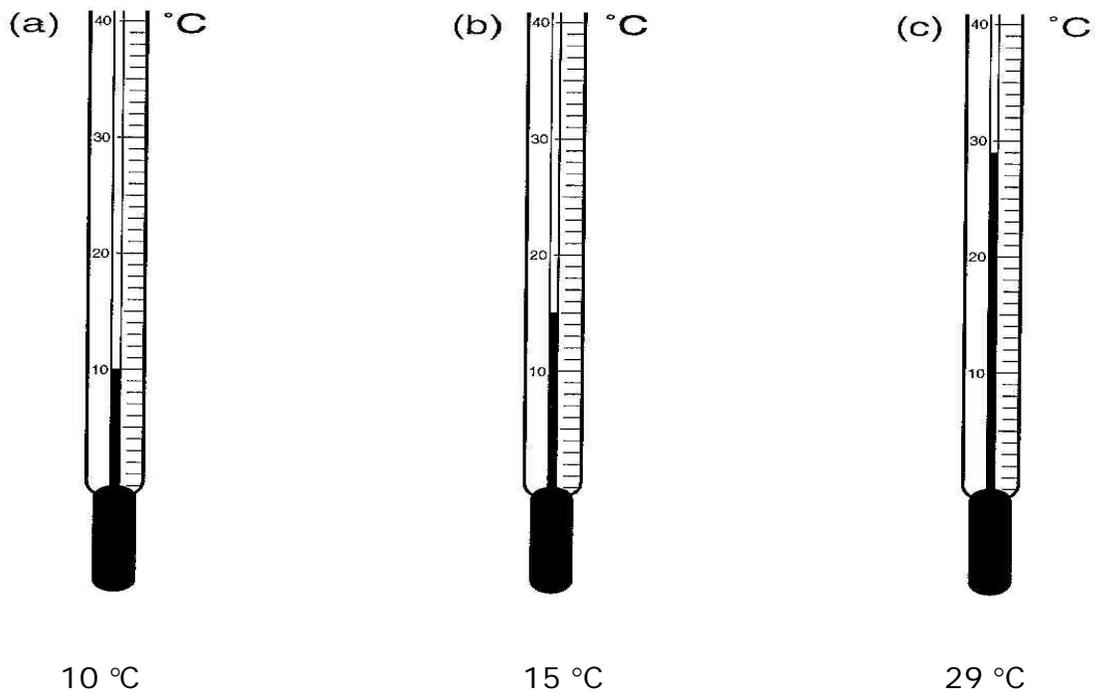


Figure Thermometer Readings

To measure the temperature of hot water, put the thermometer into the container of water. The mercury/alcohol will begin to rise up the capillary tube. When the mercury/alcohol stops rising, then read the temperature.

In cold water, on the other hand, the mercury/alcohol will not rise. The mercury/alcohol will go down. However, the reading would be taken

again, from the top of the column of mercury/alcohol. Would the temperature be high or low?

To measure the temperature of the air in the laboratory or in your classroom, wave the thermometer gently in the air.

Temperature affects the weather.

- Whether we stay home or go to the beach or river depends on how hot or cool it is. How do you feel on a hot day? Do you prefer to stay indoors or go outside to play?
- You will notice that you sweat very much on a hot day. However, this sweat on your skin will evaporate quickly.
- Air Movement

**Wind** is moving air. The Sun shines through our atmosphere all of the time. It heats the ground which in turn heats the air. Some places receive more than others. Hot air is light and rises. Cool air is heavier and sinks. As warm air rises, air from cooler areas flows in to take the place of the heated air that has risen. This movement of air is wind.

## 2. Measuring temperature

### Instructions:

1. Give each student a thermometer or use a set of thermometers for the class.
2. Let students read the temperature of the classroom and record their findings in their notebooks.
3. Go into the hallway and let students read and record the temperature.
4. Go outside. Let students read their thermometers and write down readings.
5. Let students hold the thermometer in their hands for a few minutes. Let students read and record their readings.
6. Let students discuss their readings.

**Safety Precautions**

Handle the thermometer with care. Alcohol thermometers are preferable.

Activity 3: Exploring wind

Demonstration:

Instructions: Use materials for Activity #3.

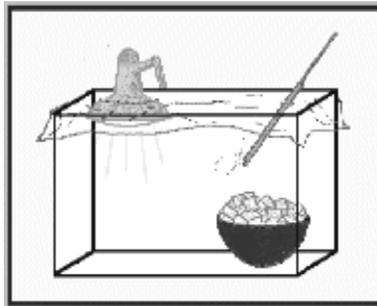
Tell students that the demonstration shows how temperature affects wind formation. The demonstration is like the way wind is produced on Earth. As they observe this demonstration, let students look for evidence of wind.

Insert a 100 watt bulb into the lamp socket. Set up the clamp lamp so that the light shines down on one end of the aquarium.

Place the bowl of ice at the other end of the aquarium and cover the aquarium with plastic wrap.

Make a small amount of smoke by lighting the end of a splint or paper. Let it burn for a few moments and then blow it out.

Puncture a hole in the plastic wrap with the lit splint near the bowl of ice. Describe what happens to the smoke.



## **ASSESSMENT**

### Sample questions

1. What does the word, temperature mean?
2. What is the name of the instrument used to measure heat?
3. Read the temperature, in °C, on a thermometer.

### Inquiry skills

Teacher can also assess students' observations and interpretation of the demonstration of how wind is formed.

## **DURATION:**

## **OBJECTIVES:**

The students should be able to:

1. Record weather using standard symbols.
2. Summarize and represent data from their recordings of the weather by using simple graphs.
3. Distinguish between weather conditions by examining weather charts.

## **PROCESS SKILLS**

Observing

Classifying

Measuring

Communicating

Inferring

Recording and Interpreting

## **TEACHING STRATEGIES**

Question and answer exercises

Pictorial demonstration

Co-operative learning

Experimenting

## **MATERIALS**

Observing weather conditions:

Materials: thermometer, weather symbols, crayons, pair of scissors, glue, copy of simplified Beaufort Scale, Science notebook

## CONTENT SUMMARY

### Weather charts

Weather charts use a set of meteorological symbols to show wind, rain, temperature and other weather conditions.

Below are some of the symbols that students may use to show different weather conditions.

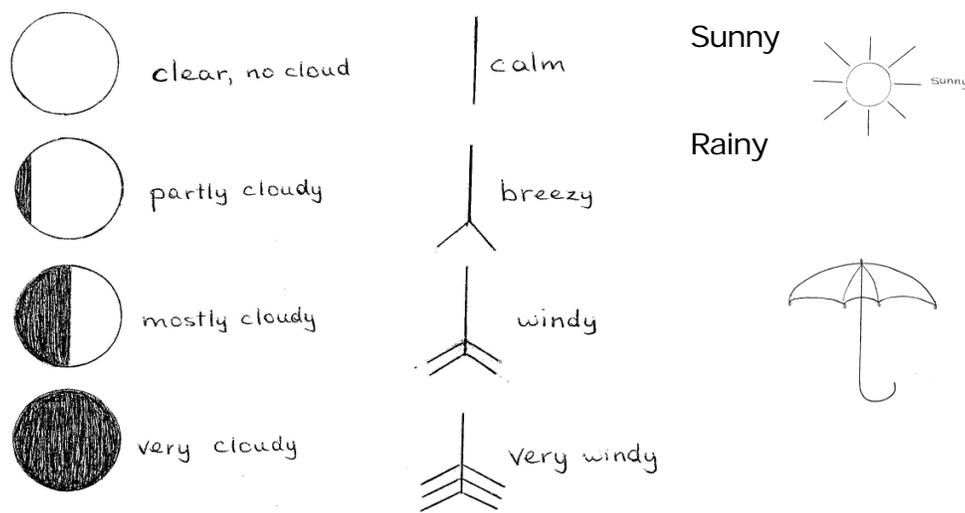


Figure Weather Symbols

## SUGGESTED ACTIVITIES

### Activity 1: Observing weather conditions

#### Instructions:

1. Look at the sky. Record whether it is sunny or cloudy.
2. Measure and record the temperature.
3. Look for signs of wind blowing. Record what the wind is doing to leaves, flags, or trees.

4. Look for rain. Record what you see.
5. Repeat steps 1 to 4 each day for one week.
6. How did the weather change?

Source: Discovery Works.(2003). Houghton Mifflin: U. S. A.

Safety Precautions:

If using a mercury thermometer, remember that the mercury is poisonous, so students must be careful that they do not let the thermometer fall.

Students should exercise care when using pair of scissors and pushpins.

Students should be warned not to look directly at the sun.

Students should not sniff glue.

Journal writing:

Recording weather:

Let students use the worksheet below to record weather for a month. Put up a chart with the weather symbols in the classroom. Let students record the weather by drawing the appropriate symbols to show the weather for each day.

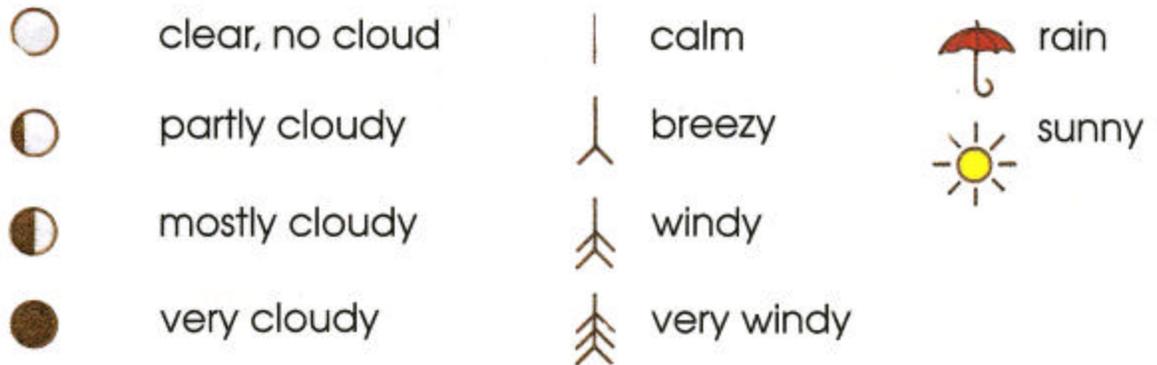
At the end of the month give a short description of the weather week by week.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

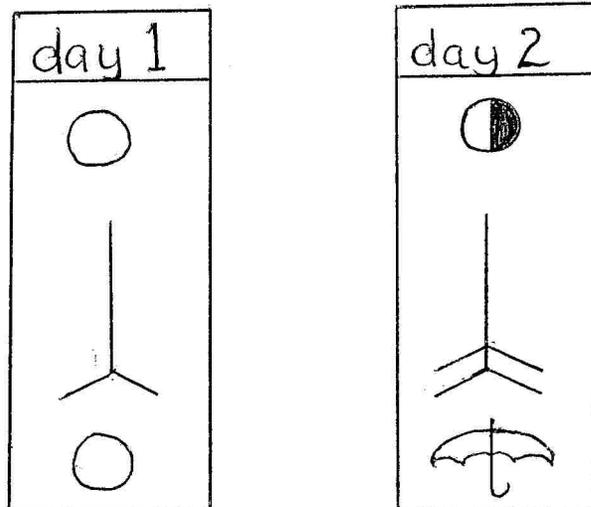
Let students draw bar graphs to show conditions like cloudiness, temperature, etc. for specific periods in the month.

## ASSESSMENT

1. These symbols show us what the weather is like.



Here are the weather records for two days.



(a) Which day was sunnier?

(1 mark)

(b) Which day was wetter?

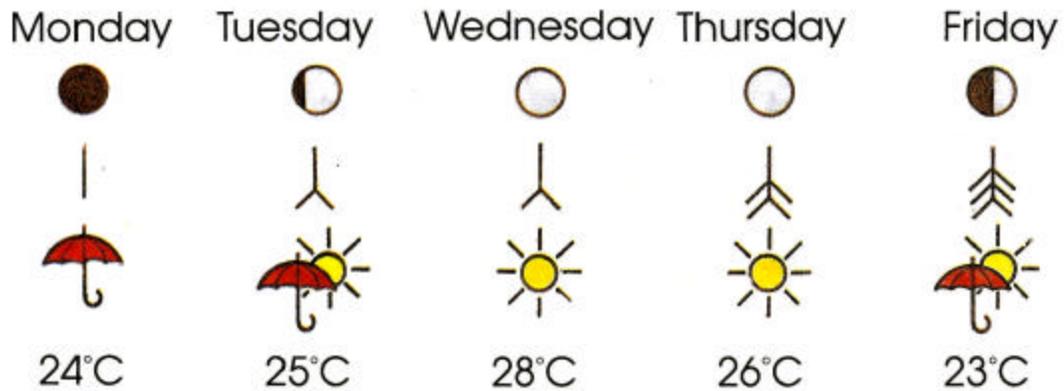
(1 mark)

(c) Which day, do you think, had the better weather? Why?

(2marks)

2. Give students maps of different islands with weather symbols in different areas. Ask them to say what the weather is at different locations.

3. Below is a weather chart.



(a) Which day was the cloudiest?

(b) On which day do you think children did not play outside?

**Adapted from: Bailey, A., Douglas, O. & Walker, E. (1994). England: Longman Group Limited**

**Sample answers:**

1. (a) Day 1

(b) Day 2

**References**

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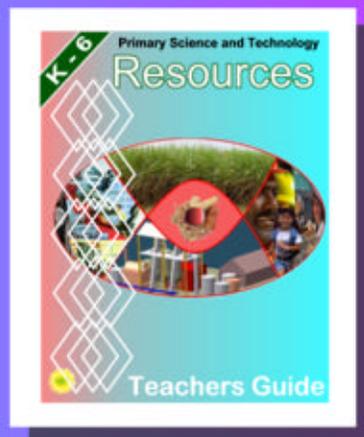
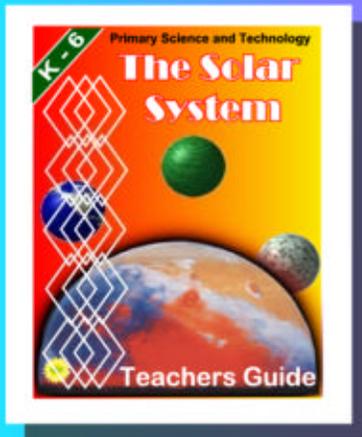
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